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THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

MARCH, 1911.

ORIGINAL ARTICLES.

ON THE PRESENCE OF A VENOUS HUM IN THE EPIGASTRIUM IN CIRRHOSIS OF THE LIVER.

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X., a physician, aged forty-nine years, had been for years a country practitioner, and had led a regular and exceedingly active life. He had lived fairly well and had taken, probably, three or four drinks of whiskey a day throughout his life. Two years previously he had had an attack of hematemesis, which followed a rather heavy supper. Since that time he had been well until eleven days before consulting me, when, one morning, while driving, he became unaccountably "nervous," coughed and vomited about an ounce of dark blood. Returning home, he went to bed. The vomiting continued, containing as much as a pint and a half of blood. This was followed by repeated tarry stools. He complained also of abdominal pain in the right side of rather an indefinite character. After this attack he placed himself on a very limited diet, but, with remarkable energy, he kept at work attending to a large general practice.

In the consulting room, on November 3, 1905, he was extremely blanched. The pulse was about 100, regular, rather soft. The apex impulse of the heart was in the fourth space within the mammillary line; a blowing systolic murmur was heard all over the cardiac area. The abdomen was full. The border of the liver was palpable one or two fingers' breadth below the costal margin in the mammillary line, and about half-way between the xyphoid cartilage and the umbilicus in the median line; it was smooth and hard. The spleen was readily palpable, descending two or three fingers' breadth below the costal margin on inspiration. There was no ascites. The hemoglobin, by the Tallqvist scale, was between 20 and 30 per cent.

The patient was advised to enter the hospital, which he did on the following day (November 4, 1905). On entry, he was very pale. Dr. Cole noted that the veins in the epigastrium and along the costal margin were a little distended and that the abdomen was decidedly full, showing a few large veins in the groins and flanks; none about the umbilicus. There was slight dulness in the right flank. The edge of the liver was well felt, smooth and rounded, and the splenic border was 3 cm. below the costal margin in the right parasternal line, reaching forward to within 2 cm. of the median line.

The patient was put to bed and given two Blaud's pills (gr. v) three times a day. Improvement was steady.

November 9. Hemoglobin, 33 per cent. (Dare).

November 16. Red corpuscles, 3,400,000; colorless corpuscles, 4000; hemoglobin, 48 per cent.

November 20. Hemoglobin, 56 per cent. The soft systolic murmur over the heart had completely disappeared. The abdomen was symmetrical; the hepatic border was palpable fully two fingers' breadth below the tip of the xyphoid cartilage. *About opposite the sixth costal cartilage, over the lower sternum, just at the base of the xyphoid, there was heard a loud continuous venous hum with slight inspiratory accentuation. It was lost immediately as one passed upward. It was transmitted a little downward, disappearing, however, before the tip of the ensiform cartilage. It was heard about 4 cm. to the right, and, faintly, about 6 cm. to the left.* A few rather large veins were visible at this point, but nothing was felt. "It seems evidently superficial, is entirely absent in the precordial region, left or right. It must be produced by some abnormality of the internal mammary veins." The spleen was still palpable two fingers' breadth below the cosatl margin.

November 27. Hemoglobin, 75 per cent. The urine throughout showed a very faint trace of sugar, only once estimable (0.4 per cent.) by the polarimeter. On entrance, there was fever, reaching 102° to 103° at night, with morning remissions. After the first forty-eight hours it was below 101°, and during the last week it never reached 100°.

The patient left the hospital on November 27, and returned to his work on Christmas Day.

In January, again, he vomited about a tablespoonful of blood, and noticed several tarry stools. There was fever in the afternoons (99° to 103°), anorexia, and dyspnœa on exertion.

He consulted me on January 19, 1906; in the morning he had vomited a tablespoonful of blood. At this time he was still pale, although the general nourishment was good. The heart sounds were clear, excepting a slight reduplication of the first sound at both apex and tricuspid areas. At the base, the second aortic was accentuated. The abdomen was full. The liver was easily felt, 7.5 cm. below the tip of the ensiform cartilage. It did not feel quite so hard as on the previous examination. *A loud venous hum was audible in the xyphoid notch.* The spleen descended 8 cm. below the costal margin.

On April 27, 1906 I saw the patient again. Since December he had had three periods during which the stools were tarry. Four or five weeks before he had had a sharp attack of pain in the lower abdomen, followed by the vomiting of about a gill of blood. He was anemic, dyspnœic, and said he was unable to walk because of dyspnœa and a sense of pain in the precordium. There had been increasing œdema of the legs. He was still very pale. The cardiac apex impulse was palpable in the fifth space, 11 cm. from the midsternal line. There was a presystolic gallop and a very slight systolic murmur which was heard about to the anterior axillary line, where it was lost. The murmur was loud and rather scratchy in the pulmonic area, feebler in the aortic, though louder here and over the manubrium than at the apex. There were fine rales at both bases.

The abdomen was a little full; the spleen readily palpable, 7.5 cm. from the costal margin. The liver was easily felt It did not seem quite so hard, extending only 6.8 cm. below the tip of the ensiform cartilage, 12 cm. above the mid-umbilicus. In the epigastrium, just over the xyphoid cartilage, and a little toward the left *there was felt a distinct, fine thrill. The same loud venous hum was audible.*

The patient gave up his practice temporarily and took a long vacation. On his return he gave up the heavier part of his work, and in the course of a few months recovered his usual health. For four years he was in remarkably good condition and led an active life.

At the author's request the patient called upon him again on October 7, 1910. He was then in excellent general condition. There had been occasional dark colored stools. No more hematemesis. For two and a half years he had had a slight umbilical hernia. He had moved from the country to the city, and given up his practice, but had been active in several responsible positions. There had been in the last several months considerable frequency of micturition and some thirst. He looked remarkably well but somewhat thinner than he used to be; of good color. Hemoglobin (Tallqvist), 85 to 90 per cent. The face was ruddy, the venules on the cheeks and nose dilated. The pulse was slow and regular; the pressure, by estimate, 130 to 140. Nothing remarkable was to be detected in the heart or lungs. The abdomen was rather full; everywhere tympanitic. The liver was to be felt just at the costal margin in the mammillary line; the border was 7.3 cm. from the tip of the xyphoid, 11 cm. from the mid-umbilicus. The spleen was just to be felt a trifle below the costal margin, descending markedly with inspiration. No thrill was felt at the episternal notch. There was no dilatation of the cutaneous veins excepting the corona hepatica. There was a distinct umbilical hernia, most marked just above the umbilicus. *Just over the xyphoid, not heard below its tip or to the right, but distinctly audible for a distance of about 3 cm. to the left, there was heard the echoing, venous hum before described. It was loudest immediately over and to the left of the xyphoid; was a continuous echoing sound exactly like the bruit de diable in the neck. There was a very distinct inspiratory accentuation. With complete expiration, when the breath was held, the murmur was diminished, and it almost disappeared when the breath was held with complete inspiration. There were no definite changes in connection with the cardiac rhythm.*

No murmurs were heard in the region of the umbilicus; no murmurs over the spleen or in Traube's space. "Such a murmur must be due to the entrance of blood from a smaller into a larger cavity; its situation suggests the point of entrance of Braune's parumbilical xyphoid vein into the roots of the internal mammary."

On Sunday, October 16, 1910, the patient was seized with a sudden attack of nausea similar, his family tell me, to several attacks which he had had during the preceding year, but which he had not mentioned to the author. During the night the vomiting continued, and the patient became drowsy.

On the morning of the 17th he became wholly unconscious. The patient was seen at this time in consultation with Dr. Chambers. He was lying on his back, breathing quietly. The pulse was regular about 80. There was no suggestion of the air-hunger of a diabetic coma. The pupils were equal and of medium size, responding to light. The conjunctival reflexes were not wholly obliterated.

The abdomen was full, bulging somewhat in the flanks. There was well marked dulness in both flanks and everywhere in the dependent parts of the abdomen. This dulness was clearly movable with change of position. The liver dulness was diminished. The border was not palpable, and in the median line the liver could be felt just below the tip of the xyphoid cartilage. The dulness in the mammillary line did not reach the costal margin. The spleen was of about the same size as at the last note. *The venous hum in the epigastrium had entirely disappeared.*

The urine, examined by Dr. Chambers the day before, was free from albumin and sugar, and showed no reaction for bile.

The coma deepened as the day wore on, the respiration and pulse becoming more accelerated. In the evening several violent convulsions occurred, and the patient died at about 10 o'clock at night. A necropsy was not permitted.

In summary, then, in a man, aged forty-nine years, with evidences of hepatic cirrhosis—habits, hematemesis, melena, large, firm liver, splenomegaly, and a slight glycosuria—there was detected *a continuous thrill and a long, loud bruit de diable in the epigastrium.* The thrill was felt just in the xyphoid region and a little toward the left, above the lower margin of the liver. The murmur, a characteristic venous hum with inspiratory accentuation, was audible in a limited area immediately about the xyphoid cartilage. It was not audible about the umbilicus. There were no cutaneous varicosities. Five years after the detection of the murmur the patient, who, a week before, had been in good condition, was seized with nausea, vomiting, drowsiness, and finally coma, and died in convulsions about thirty-six hours after the onset of his illness. During the last day of his life there was well marked ascites and the epigastric murmur had entirely disappeared for the first time since its detection.

The condition was obviously a portal cirrhosis of the liver in which ascites was absent during the greater part of the course, owing, undoubtedly, to the existence of a free anastomotic circulation. The manner of death was such as is characteristic of hepatic insufficiency.

The remarkable feature of the case, that which throughout was of especial interest to the author, was the presence of the thrill and venous hum in the epigastrium. What was the cause of this phenomenon? There are various possibilities. It might have been a murmur arising in the vena cava inferior and heard loudest in the epigastrium near the point of entrance of the vena cava into the right auricle. Gambarati advances a like hypothesis to account for a murmur which was in some respects similar to that heard in our case.

Piazza Martini (1894) has described a slight soft murmur heard over the hepatic area, especially in the right axilla, which he believes to be due to constrictions in the vena cava as it passes behind the liver, owing to changes in the position or deformity of the latter organ or to pressure from without (tumors, etc.). Pressure or traction on the superior cava from an old pleurisy or pericarditis would seem to be out of the question from the history of the patient and the physical examination. One might, indeed, fancy that, in the course of the cava through the sulcus in the posterior surface of a deformed, cirrhotic liver, constrictions might arise sufficient to result in fluid veins capable of producing an audible murmur.

Several considerations, however, would appear to militate against this hypothesis: (*a*) The limited area in which the murmur was heard. A murmur of such intensity arising in the inferior cava behind the liver should be audible over a considerably larger area, as it was, indeed, in Gambarati's case. (*b*) It is hardly conceivable that a murmur arising in the inferior cava should cause a distinct epigastric thrill. (*c*) The murmur was audible with greater intensity on the left side of the epigastrium, and the thrill was detected only on the left, that is, at a point not over the superior cava.

Might the murmur have arisen in dilated coronary veins or in œsophageal hemorrhoids which, in view of the hematemesis, were in all probability present? The situation in which it was heard might, indeed, support the former hypothesis. That a palpable thrill could be transmitted from veins so deeply placed seems, however, scarcely probable.

The murmur could hardly have arisen in a large umbilical or parumbilical vein, because of its absence in the neighborhood of the umbilicus or between it and the tip of the xyphoid.

The thrill would suggest that the veins in which the vibrations arose must have been in or in close apposition to the abdominal wall. It seemed to us from the outset probable that these vessels were varicosities dependent on anastomoses between dilated venules in the suspensory ligament and radicles of the internal mammary veins. The immediate cause of such a murmur would appear to be the passage of blood under considerable pressure from a smaller into a larger vessel, or, indeed, the passage of blood through a single vessel with varicose dilatations.

On turning to the literature one finds a considerable number of contributions on the subject of venous murmurs in the epigastrium.

Pégot, in 1833, described an instance of cirrhosis of the liver with great dilatation of what he regarded as a persisting umbilical vein, attended by remarkable varicosities about the umbilicus and in the epigastrium. Over these veins one could hear a slight murmur—"par l'auscultation, on entendait un léger bruissement qui n'était sensible qu'à l'ombilic."

Bamberger, in 1851, reported a similar case with enormous pyramidal varicosities between the umbilicus and ensiform cartilage. With the hand over these veins, a slight thrill was to be felt, and, with the stethoscope, a continuous rustling sound could be heard.

Since this time many observers have referred to the thrill and murmur which may at times be heard over the varicosities occasionally seen about the umbilicus and in the epigastrium in cirrhosis. Charcot, indeed, says: "A murmur which one hears by auscultation, a thrill which the hand detects, are perceived over these veins. They are," he says, "on general principles, signs of a favorable import."

Catti describes a case of cirrhosis with cutaneous varices in the epigastrium, especially of the left vena epigastrica tegumentosa. Over this vein a few centimeters to the left of the navel, an intense thrill and loud murmur were audible—a characteristic venous hum. Below, over the abdomen, there could be heard a musical ringing sound like that of an Æolian harp. By compressing the vein about 1 cm. below the point where the thrill was most marked, the whole phenomenon stopped abruptly, to begin again on removing compression. Pressure above had no effect. At autopsy, the subperitoneal veins were found to be large and the ligamentum teres was voluminous. Such a murmur was clearly due to blood passing under rather a high pressure from smaller anastomotic vessels into the dilated vena epigastrica tegumentosa.

There has been more or less discussion as to the exact nature of the disturbances of circulation causing these extensive varicosities. Rokitansky's original contention that the condition was associated with the dilatation of an incompletely obliterated umbilical vein was disputed by Sappey, who showed that some, and contended that all, of these instances were dependent on dilatation of small parumbilical veins running in the broad ligament. While this is doubtless true in many, perhaps in the majority of instances of extensive *caput medusæ*, the observations of Bamberger, Hoffman, Baumgarten, Picchini, and others show that in some instances at least the large vein in the ligamentum teres is truly a persistent umbilical vein which has been distended as a result of the abnormally high pressure in the portal system.

There are, however, other instances in which a loud venous hum has been audible in the epigastrium in cases of hepatic cirrhosis *without* the presence of notably large cutaneous veins. Sappey, in 1859, describes a case which was demonstrated to him by Trousseau. The patient was a man of about fifty, with cirrhosis of the liver. "On applying the ear or the stethoscope to the abdomen of this patient, one perceived a very distinct bruit, consisting in a sort of continuous murmur." At necropsy, there was found "a voluminous vein extending from the sinus of the portal vein toward the umbilicus, where it ramified and anastomosed with the epigastric veins, which seemed to be its prolongation Underneath the vein, in the free border of the suspensory ligament, was to be seen the cord of the umbilical vein." Sappey concludes that this large vein was the result of the dilatation of one of the venules which accompany the umbilical vein, and not of the vein itself.

Picchini, in a case of cirrhosis in a boy of sixteen, noted a well-marked thrill on palpation in the epigastrium. This was present in a fairly extensive zone, extending from 1 cm. under the apex of the xyphoid to the umbilicus, with its maximum intensity along the median line, diminishing toward the sides so as not to be felt beyond either parasternal line. It ceased immediately below the umbilicus. It was continuous, slightly diminished by pressure. On auscultation, there was an intense murmur unmodified by respiration or by heart sounds, best audible when the stethoscope was lightly applied, and loudest a little above the umbilicus. The spleen was large; the liver was rather small. There was ascites. After tapping, the murmur became less intense and was limited to the median line. At necropsy, the external anastomoses about the umbilicus were slight. On the internal surface, along the median line, a large single trunk was found, "which, from the umbilicus, along the fold which unites this with the triangular ligament of the liver, had an upward direction, reached the inferior surface of the liver at the incisure which separates the right from the left lobe, and then folding itself under this, continued toward the hilum of the liver." On further dissection, it was shown that this vein left the anterior surface of the portal vein 3 mm. before its bifurcation at the hilum. Here it was more than one-half as large as the portal. After a course of 2 or 3 mm., it received three trunks of from 2 to 3 mm. in diameter, one after the other, one from the branch of the portal vein destined to the right lobe, the other two from the branch directed to the left lobe. By these additions, the vessel acquired a volume as large as that of the portal vein. In its course along the concave surface of the liver it received no new branches and none between the liver and the umbilicus. There were varicose dilatations about the umbilicus. Picchini considers this a true although somewhat anomalous umbilical vein, firstly because he could find no trace of the obliterated vein, and secondly, because of the absence of anastomoses in its course between the liver and the umbilicus.

Audry mentions the case of an individual, aged fifty years, with exophthalmic goitre, jaundice, and a liver descending to the iliac crest. Above the xyphoid process and along the linea alba there was an intense, continuous souffle, with systolic accentuation, analogous to the murmurs of the chlorotic. Below the umbilicus, a systolic murmur only was heard. No necropsy was reported.

Herbert Davies is quoted by Verstraeten as having described an analogous case. He found a continuous snoring murmur, varying in intensity with inspiration, and occupying the epigastric region to the right of the median line, a little above the umbilicus. This abnormal murmur existed in an individual suffering from hepatic cirrhosis. Davies regarded it as dependent on a collateral current which was established between the portal and epigastric veins.

F. Taylor describes the case of a boy who showed the first evidences of cirrhosis of the liver at six, dying at twenty. He had been ascitic and had had various attacks of hematemesis, but the ascites had disappeared. Death resulted from a general infection. During the year before death an epigastric venous hum was noted. Particulars as to the anastomoses in the epigastrium are not given.

Von Jacksch (1893), in a case of cirrhosis with large liver and spleen, observed a remarkable thrill, which was palpable when the hand was laid on the abdominal wall between the umbilicus and ensiform cartilage. On auscultation in this area one could hear a humming murmur, which might best be compared to the rumbling of a threshing machine. No mention is made of dilated cutaneous veins. At necropsy which revealed a high grade of cirrhosis, "the vena coronaria ventriculi, which opened here 1 cm. above the vena lienalis, into the trunk of the vena portæ, was greatly distended, markedly tortuous, and beset with many varicose dilatations which, in part, were so large as to admit the extremity of the thumb and to form true blood cysts." The vena umbilicalis was wide open from the left main branch of the portal vein for a space of 7.6 cm., at which point it connected with a thin-walled, varicose Sappey's vein coming from the umbilicus and of an average diameter of 8 mm. From this point to the navel the umbilical vein was pervious only for a hair sound. "From this observation," says von Jacksch, "there can apparently be no doubt that the murmurs which were heard in the case arose in the vena coronaria ventriculi."

Scheele, in a man of forty-six, with jaundice, ascites, and a large, tender, and uneven liver, detected in the region of the umbilicus a very well marked continuous thrill. There was no dilatation of the cutaneous veins. In the dorsal decubitus there was a distinct *bruit de diable*, accentuated on inspiration and diminished on expiration and by pressure on the crural veins. It disappeared in the erect posture, was audible only in the umbilical region, and was not transmitted toward the heart. There was no apparent abnormality in the heart or large veins.

Gambarati, as above mentioned, has described an interesting case which in some respects resembles that described by the author. The patient was a man, aged forty-nine years, with a retracted right chest from an old pleurisy, and an apparent hepatic cirrhosis. The liver was small, the superficial abdominal veins were dilated, especially in the epigastrium passing up toward the chest. The spleen was enlarged. There was ascites. Over the sternum and all over the hepatic area there was a continuous murmur similar in character to the ordinary venous hum in the neck. It was composed of two phases, varying in duration and intensity. The author compared it to the murmur or roaring of a strong wind blowing through a small orifice, and the variations in the intensity of the murmur reminded one of the irregular gusts and lulls of such a wind. Sometimes the murmur appeared more intense with cardiac diastole. It was very superficial and its point of greatest intensity was distinctly at the base of the xyphoid, but it was not heard below or over the xyphoid itself. On very deep, long breaths it seemed louder—clearly a humming-top murmur. It was not altered by lying on one side or another, but was a little louder in the erect posture, and when, after standing, the patient suddenly lay down and assumed the knee-elbow posture, it sometimes diminished or even disappeared for a time. On tying a tight bandage about the chest a few centimeters above the base of the xyphoid, the murmur became weaker, but if the bandage was applied below the costal arch, it became much feebler and sometimes even disappeared. Gambarati believes that the murmur was due to "a contriction of the inferior cava in its passage through the hepatic sulcus, dependent on atropic changes in the liver."

Rolleston says: "In rare instances, a venous hum may be heard over the epigastrium, which is increased on inspiration. It has been explained as the result of compensatory dilatation of the venous communications between the portal and general systemic veins. The thin-walled and dilated veins may readily be kinked as the result of adhesions, or temporarily distorted by the descent of the diaphragm, or even by the pressure of a wooden stethoscope.

"In a man, aged forty-three years, who was under my care at St. George's Hospital, there was a continuous *bruit de diable* in the neck. At autopsy, the liver was markedly cirrhotic and the round ligament contained a thin-walled vein as large as the little finger." This is stated to have been a parumbilical vein.

Catti describes the case of a man, aged fifty-one years, with atrophic cirrhosis and a palpable spleen. The cutaneous abdominal veins were moderately dilated. In the xyphi-sternal notch a very loud venous hum was audible, which was transmitted with diminished intensity as far as the mid-sternum; it was increased on inspiration. There was no thrill. After paracentesis of the abdomen the murmur was much less intense.

It should, however, be remembered that epigastric venous murmurs are heard under other conditions. Roeser, in 1862, comments on the occasional presence of a continuous murmur in the epigastrium in advanced cases of splenic enlargement, apart from the not infrequent souffle in the splenic artery. Moreover, he says: "There are cases where the portal vein is accessible; it is here a continuous murmur."

Piazza-Martini (1898), in three cases of chronic splenic tumor, has heard a venous hum in Traube's space below the apex of the heart from the sixth space to within 1 cm. of the costal margin, and between the left parasternal and anterior axillary lines. In the right lateral decubitus the area in which the sound was heard was lower down and farther out. When lying on the left side it was heard higher up and nearer the parasternal line. He is inclined to think that it arises in the coronary vein of the stomach.

Von Jacksch describes an instance of cirrhosis in which a venous hum was audible in the left side of the epigastrium in the angle between the large liver and the spleen. At necropsy the splenic vein was found to be so far dilated as to admit the tip of the little finger. All the radicles of the portal vein were dilated, as well as the veins in the lesser omentum and those in the ligamentum teres. "From the anatomical observations there can be no doubt that the murmurs arose in the splenic vein." It must be said that the character of the murmur appears to have been not so distinctly that of a venous hum as in some of the other reported cases.

Catti asserts that in his experience a venous hum is audible over the spleen in nearly every fifth case of chronic tumor; this was best heard, as a rule, over the anterior part.

Other observers have called attention to the occasional presence of a venous hum in the epigastrium just above and to the right of the umbilicus—a hum which is believed to arise in the vena cava inferior.

Cejka, in 1850, says: "With yielding abdominal walls, one needs only to seek the ascending vena cava with the stethoscope according to the dictates of anatomical topography, to perceive a humming murmur (*Nonnengeräusch*) to the right of the median line, and to follow it downward in the course of the vein to the point of its division."

Hammernik, in 1853, describes at length the venous hums over the crurals and inferior cava. These murmurs are usually found only in young and anemic individuals, and may be followed upward from the crurals to the inferior cava. "This venous hum (*Nonnengeräusch*) is continuous, shows no period of accentuation, and is not altered by the respiratory movements."

Friedreich, in 1881, says: "I have myself heard these not infrequently by pressing slowly and continuously on the right, near the linea alba, at about the level of the navel, with a stethoscope with a wide funnel, until the vein in the depths is fully compressed; this is easy to accomplish with the patient on his back and the legs drawn up, especially in those individuals with lax abdominal walls. On suddenly letting up the pressure, there is a loud, rapidly diminishing venous hum. Sometimes, if pressure is properly adjusted, there is a continuous singing or humming murmur." In one case such a murmur disappeared on pressure on one or another crural vein.

Audry asserts that the presence of a venous hum in the epigastrium, a little above and to the right of the umbilicus, is by no means rare. It is similar in character to a diastolic venous souffle, and it is, he thinks, due to the emptying of the veins with diastolic filling of the ventricle. He has not been able to confirm Friedreich's observation of the disappearance of the murmur by pressure on the crural vein. The timbre and the continuous character of the sound, as well as its localization over the vena cava inferior, justify placing this phenomenon among the venous murmurs. Audry comments on the fact that in the several notes on epigastric venous hum in cirrhosis, no mention is made as to the differential diagnosis between it and these murmurs, which he believes due to vibrations arising in the vena cava inferior. He was able to detect these hums in ten out of forty cases. Most of the patients were anemic or suffering from conditions associated often with low blood pressure and vasodilatation, *i. e.*, neurasthenia, typhoid fever, pelvic peritonitis. The murmur which was sometimes audible on pressure, would appear to be similar to that described by Friedreich.

Verstraeten asserts that venous hums in the epigastrium are not very rare. He has been able to make out such murmurs in six out of 100 cases. They arise, he thinks, at the point where the vena cava enters the liver.

Yet another form of venous hum has been described in the region of the liver. Piazza-Martini (1894) notes a continuous venous hum, which is audible sometimes in the right axilla over the liver This he regards as entirely different from the epigastric murmur. It is, he believes, due to pressure on the vena cava by a displacement or rotation of the liver or by extrinsic compression or tumors within the vessel. Verstraeten also is familiar with this murmur, which he likens to a distant waterfall. It is accentuated with full inspiration and is audible, especially in marked anemias.

The writer has, in a limited number of cases, sought for the murmur described by Friedreich and others as arising in the *vena cava inferior.* By following Friedreich's technique, it is indeed possible to produce in some cases a slight venous hum. In one very anemic man it was fairly loud. This is, however, quite distinct from the loud murmur and palpable thrill heard in our patient and in the several other cases of hepatic cirrhosis above described, on light application of the stethoscope.

With the soft murmur in the right axilla described by Verstraeten and Piazza-Martini, I am unfamiliar. It is, however, not to be confounded with the epigastric venous hum of cirrhosis.

To return to our own case. The phenomena here observed were somewhat different from most of those reported in the literature In Audry's first case—a man, aged fifty years, with exophthalmic goitre, jaundice, and a liver descending to the iliac crest—there was a continuous souffle, very intense, with systolic accentuation, analogous, according to the author, to the souffle of the chlorotic. This was heard above from the xyphoid, along the linea alba. Below the umbilicus there was a systolic murmur alone. In this instance the murmur was apparently loud and heard well up to the xyphoid notch, over a liver which may have been cirrhotic. Such a murmur may have been due to varicosities in the abdominal wall or suspensory ligament.

In most of the other cases the position of the murmur was such that it may well have depended on large umbilical or parumbilical veins.

The cases of Gambarati and Catti and one of the cases of von Jacksch are most similar to that which forms the subject of this communication. In all of these instances the point of maximum intensity of the murmur was at the base of the xyphoid process. In von Jacksch's patient, to be sure, the thrill was felt at a point somewhat lower than in our case. In the other two instances, however, the point of greatest intensity of the murmur was at the base of the xyphoid.

In Gambarati's patient the distribution of the murmur was remarkably wide, extending over the entire hepatic area and to the episternal notch. This wide distribution of this murmur might be regarded as supporting his hypothesis that it depended upon fluid veins arising in the inferior cava. Against such an hypothesis, however, would seem to be the complete absence of the murmur in the back. This he accounts for by the statement that there was hydrothorax on the right side. It should be observed, however that he also asserts that the right chest was retracted from an old chronic pleurisy, a condition which it is difficult to harmonize with the presence of a hydrothorax.

Of all the cases in the literature that of Catti is the one which is most analogous to ours, and the hypothesis which he advances to explain the phenomenon agrees entirely with our own conclusions, formed before we were familiar with his communication.

In our patient the limited area of transmission, the extremely superficial character of the murmur, and especially the presence of a thrill, seemed to us, as has been said, to suggest that the murmur arose as a result of anastomoses in the abdominal wall between veins derived from the suspensory ligament of the liver and radicles of the internal mammary vessels. Catti, in his excellent article, refers to the admirable studies of Braune, who, indeed, has described a venous link which connects the large parumbilical vein (Sappey-Luschka) with the left vena epigastrica superior profunda in the neighborhood of the xyphoid. In Braune's own words: "This venous link extends above the fascia transversalis umbilicalis of Richet, from the larger parumbilical vein near the obliterated umbilical vein, passes between the folds of the suspensory ligament of the liver for a certain distance upward behind the sheath of the rectus, breaks through this close by the middle line and, behind the muscle substance of the rectus, in the anterior side of the posterior fold of its sheath, near the xyphoid process, it enters into the left vena epigastrica superior profunda.. It is a double, well recognizable and easily injected vessel, which, therefore, leads from the sinus venæ portæ upward to the mammaria interna." Braune further points out that by the transverse xyphoid vein this vein must carry the blood from the portal to the internal mammary of both sides. He regards this vein as a regular structure.

Catti is inclined to consider the murmur in his case, which is so similar to ours, as dependent upon vibrations arising from the passage of blood from Braune's veins into the left deep epigastric vein, the root of the internal mammary. Such an hypothesis would seem to be directly applicable to our case, more so, indeed, than to any other instance in literature.

To what may we ascribe the disappearance of the murmur during the last hours of life? This is, of course, a question which, in the absence of a necropsy, cannot be answered. The coincidence of the onset of ascites with the disappearance of the murmur might suggest the possibility of thrombosis. The fact, however, that a loud venous hum, sometimes accompanied by a thrill, may be detected in the epigastrium in cirrhosis of the liver, is worthy of emphasis. It is not inconceivable that this phenomenon might, on occasions, prove a point of diagnostic value. It would be well that its occasional occurrence might generally be recognized.

In conclusion, it may be said: (1) A venous hum accompanied sometimes by a well-marked thrill may be detected in the epigastrium in some instances of hepatic cirrhosis.

2. The thrill and murmur may be appreciable: (*a*) directly over the extensive cutaneous varicosities, or (*b*) in instances where there is little or no external evidence of venous engorgement.

3. In most of the cases where an epigastric venous hum has been heard in cirrhosis, in the absence of cutaneous varicosities, the sound has been audible best about the umbilicus and along the median line in the epigastrium—in other words, along the course of the round ligament.

4. In a few of these instances it has been found that the incompletely closed umbilical vein has become greatly dilated as a result of increased portal pressure. In others, a large dilated vein has been found in the round ligament running alongside of the obliterated umbilical vessel—doubtless a dilatation of a small parumbilical vein.

5. These murmurs should be distinguished from the slight venous hum sometimes heard in the anemic just above and to the right of the umbilicus, over the inferior vena cava—murmurs which may be brought out by pressure in thin individuals. These murmurs are said to disappear in some cases with pressure on one or another femoral vein (Friedreich).

6. A venous hum has been described in Traube's space and in the left side of the epigastrium in the angle between the large liver and spleen in cirrhosis (von Jacksch, 1899) and in splenic enlargement (Piazza-Martini, 1898), which may arise in a varicose splenic vein.

7. A well-marked thrill and an intense venous hum may be heard in hepatic cirrhosis over a limited area in the epigastric notch, in the immediate neighborhood of the xyphoid cartilage, at a point so far above the lower border of the enlarged liver that it cannot depend upon currents in a varicose umbilical or parumbilical vein. Such murmurs may, in some instances, arise in varicose coronary veins (von Jacksch), while in others, as those observed by Catti and the author, the seat of origin is probably in anastomoses between the roots of the internal mammary and the inferior deep epigastric vessels, very possibly to the entrance into these latter veins of an enlarged parumbilical-xyphoid vein of Braune.

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